A QUARTERLY NEWSLETTER PUBLISHED BY NECA-IBEW

The Silicon Valley Wire

The latest news from the electrical industry in Silicon Valley 1st Quarter 2012

Photo By Nick Elias

CUPERTINO ELECTRIC TEAM FROM LEFT TO RIGHT: Tom Stone, Mike Minkel, Brian Keys, Kristie Kloeppel, Brett McClure, Janet Hamm, Mike Kelley, David Schilling, James Williams, Russ Walling.

Cupertino Electric Wires One Of Silicon Valley's Largest Data Centers

DuPont Fabros Technology, Inc.'s (NYSE: DFT) SC1 data center, one of the largest data centers built in Silicon Valley, recently opened in Santa Clara, with Cupertino Electric, Inc. (CEI) playing a critical role as the electrical contractor.

Photo By Nick Elias

External view of the sprawling data center in Santa Clara, California.

HOLDER Construction Company, one of the largest data center builders in the country, served as the General Contractor for the 360,000 square foot project. SC1 is built in two identical phases; each comprised of 180,000 gross square feet, 88,000 square feet of raised floor, and 18.2 MW of available critical load. The multi-tenant facility is powered by its own dedicated substation, also wired by CEI.

CEI, which has a long history of wiring successful data projects for Fortune 500 companies, provided design assistance and wired all of SC1's electrical systems, which include its medium voltage power distribution system, its 600 volt power distribution system, its emergency power distribution system, and its low voltage systems, including the security system, fire alarm system and teledata wiring.

Photo By Nick Elias

Cupertino Electric employees walk the 1,097 foot walkway that intersects the computer and electrical equipment rooms.

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Photo Courtesy of Holder Construction Company.

Stretch and Flex exercises take place on site.

SC1 Data Center Wired By CEI, Inc.

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"Because of their data center expertise, technical staff and ability to consistently deliver high quality results, we chose Cupertino Electric for this data center."

- Jason Bell
Holder Construction Company


Photo Courtesy of DuPont Fabros Technology, Inc.

Aerial view of SC1 data center, which has an approximate linear footprint equal to the size of a Nimitz class aircraft carrier.


Photography By Nick Elias

Cupertino Electric employees discuss the 11,000 square feet of rentable computer room space.

CEI designed and built SC1's on-site 60kV substation which has a capacity of 60MVA and supplies electricity into the data center's medium voltage switchgear. The substation is equipped with two main and one redundant substation transformers served from two diverse SVP (Silicon Valley Power) 60kV services.

Computer rooms in SC1 are ready for customer equipment deployment and can be operational in a matter of weeks, avoiding long lead times and the large capital outlay required to construct a new data center. The computer rooms at SC1 range in size from approximately 2,700 square feet up to 11,000 square feet and each is customized to meet the tenant's needs. Computer rooms are leased by the amount of UPS (Uninterruptible Power Supply) critical power available to the room (not by the size of the room) and due to the redundancy designed into the building's electrical system, tenants can use all of that critical power with a 100% Service Level Agreement. Efficiencies realized by the design and scale of the building benefit SC1 tenants in the form of low operating costs.

As tenants computing requirements increase, they are able to take additional space when needed without enduring the total cost of data center ownership. Customers can build out and scale their deployment and consume all of the dedicated available critical power to the computer room.

DFT evolved its business model for SC1 from a proprietary, state-of-the-art design that includes large high density computer rooms that benefit from a cutting edge UPS system topology known as Isolated-Parallel and an efficient evaporative chilled water mechanical plant.

The facility is designed and constructed in accordance with LEED standards. The same building design has achieved LEED Gold certification in the Company's other developments. This is DFT's first project on the West Coast.

SC1 DATA CENTER SNAPSHOT:

DEVELOPER AND MANAGER:
DuPont Fabros Technology, Inc. (NYSE: DFT)

SIZE:
360,000 gross square feet
176,000 raised square feet
36.4 MW of critical load
29,000 square foot substation

AREAS OF DATA CENTER:
Computer rooms to house servers; chiller plant; electrical equipment rooms; engine generator rooms; core office area

ELECTRICAL WIRING DETAILS:
2,611,520 feet of wire;
1,692,190 feet of conduit;
22,118 yards of slurry;
14 months to construct

The data center's electric equipment, generator room and chilled water plant.

"Customers can feel comfortable their mission critical infrastructure is being supported by a proven facility design and operations team," said Paul Hopkins, the Regional VP of Sales and Leasing for DuPont Fabros Technology, Inc.

The main areas of the building include the computer rooms that house the servers, the chiller plant that runs the cooling system for the entire data center; the electrical equipment rooms which house the main and redundant electrical feeds; the diesel-engine generator backup rooms, which contain the backup emergency power systems, as well as a core office area that contains administrative space and conference rooms.

CEI worked with 333 electricians from the International Brotherhood of Electrical Workers (IBEW) Local 332 in San Jose on the project, which was constructed on a fast track timetable of 14 months.

The center is so large that some of CEI's wiring details belong in Ripley's Believe It or Not. In wiring the facility, CEI used approximately 2.6 million feet of wire, 1.7 million feet of conduit and 22,000 yards of slurry.

The data center may also set a record in Silicon Valley for the number of female construction executives in prominent roles, since two of the key project managers were women. CEI's project manager, Kristie Kloeppel, and Holder's project manager, Jessica Potkovick, both highly experienced executives, provided day-to-day oversight for the building project, turning it in on time and on budget.

"The data center was built in two phases,' said Kristie Kloeppel, project manager for Cupertino Electric. "Currently, the entire shell has been built, and we have finished wiring all of Phase One. Of the 360,000 square feet of space, 176,000 is raised floor space, with the remainder used for office space, engine generator rooms, equipment rooms and chiller plant."

Working with Kratos, a specialized security designer, CEI wired and installed a multi-faceted security system that utilizes sophisticated monitoring and surveillance equipment, including exterior and interior cameras and a card access system.

CEI installed a pre-action Notifier fire alarm system. The system's sprinkler pipes normally carry air, not water. If detectors (either under the floor or on the ceiling) sense smoke, a trouble signal is sent to the central fire alarm panel which will command the pre-action sprinkler valve to charge the pipes with water. Once charged, water will not be released unless sprinkler heads open due to heat.

All along the way, the data project was built with a strong team effort masterminded by DFT and Holder Construction. "Cupertino Electric's ability to integrate seamlessly into any project is like having a virtual extension of our own team," said Holder project manager Jessica Potkovick.

DuPont Fabros Technology, Inc. is a real estate investment trust (REIT) and leading owner, developer, operator and manager of wholesale data centers. The company's data centers are highly specialized, secure, network-neutral facilities used primarily by national and international Internet and enterprise companies to house, power and cool the computer servers that support many of their most critical business processes.

SC1 DATA CENTER ELECTRICAL SNAPSHOT:

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Project Executive

Kristie Kloeppel,
Project Manager

David Schilling,
General Foreman

Jason Buchanan,
General Foreman

Jim Burdick,
General Foreman

Brian Keys,
Commissioning Manager

Brett McClure,
General Foreman

Tom Stone,
General Foreman

Herman Limosnero,
General Foreman

Mike Minkel,
Safety Manager

ELECTRICIANS:
333 electricians from
IBEW Local 332 in San Jose

SC1 DATA CENTER PROJECT TEAM:

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ARCHITECT:
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CAS Architects

ENGINEER:
CCG Facilities Integration

STRUCTURAL:
Structural Engineers, Inc.

GENERAL CONTRACTOR:

Holder Data Center Builders

Jason Bell,
Senior Project Manager

Mike O'Connor,
Senior Superintendent

Jessica Potkovick,
Project Manager

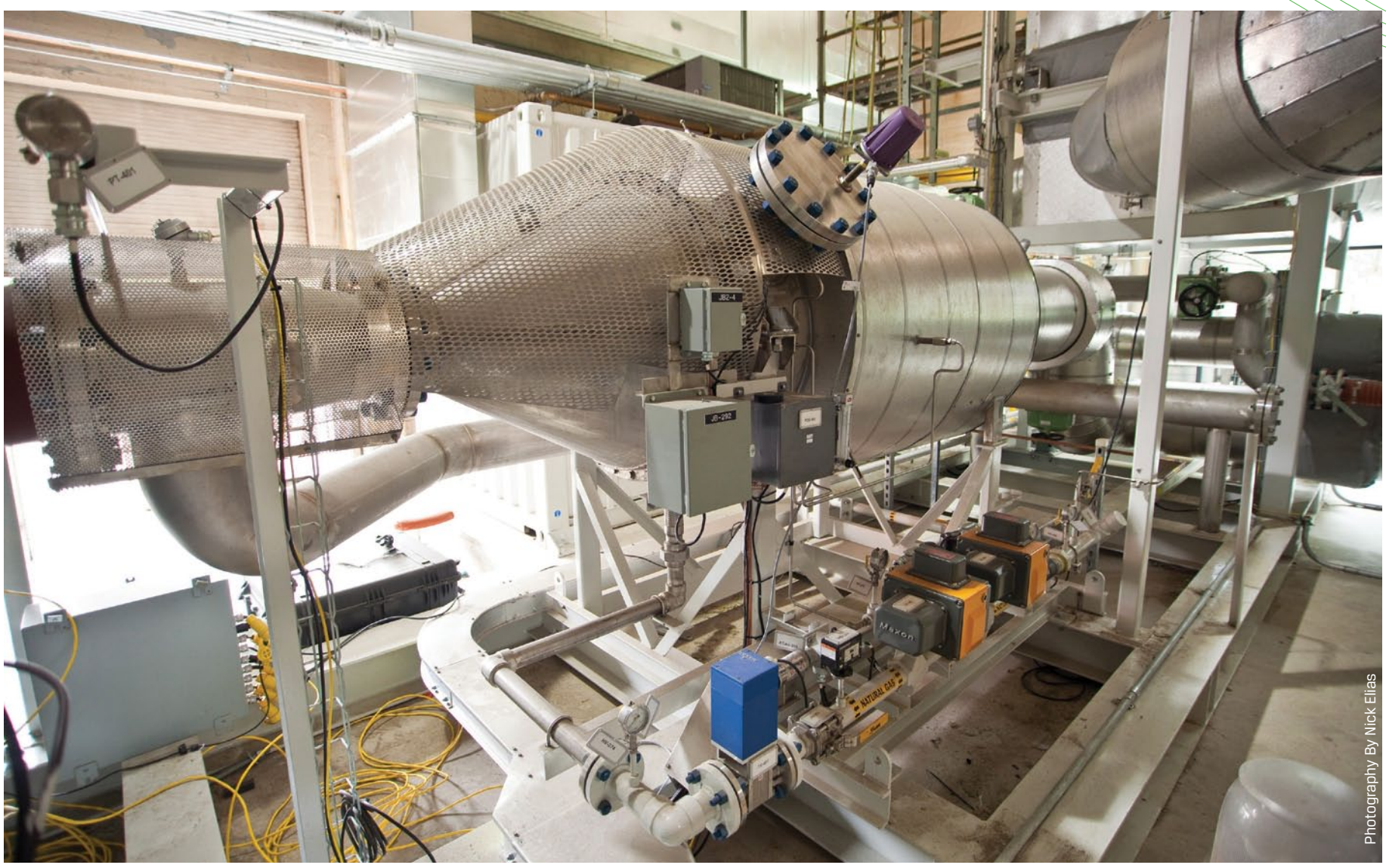
ELECTRICAL CONTRACTOR:
Cupertino Electric, Inc.

MECHANICAL/PLUMBING CONTRACTOR:
Southland Industries

CONTROLS:
ACCO

For more information about CEI's Data Center Services, please contact Autumn_Casadonte@CEI.com, call 408.808.8034 or go to www.CEI.com.

Sprig Electric Installs Pilot Fuel Cell Ene To Offset Heating Costs And Reduce Gr



Sprig Electric wired an innovative fuel cell energy mini-plant at San Francisco State University to offset campus heating costs.

Sprig Electric team members discuss the hydrogen fuel cell module at San Francisco State University.

Jim Conlow, Division Manager of Energy Solutions, Sprig Electric, explains how the hydrogen fuel cell mini-plant produces energy.

At San Francisco State University (SFSU), an innovative fuel cell energy project is now up and running, thanks to Sprig Electric of San Jose.

Fuel cells operate using natural gas, and are an alternative to solar power.

SEARCHING for a way to decrease its dependence on the grid, San Francisco State University elected to go with a pilot fuel cell energy mini-plant that offsets about $300,000 of campus heating costs annually. It also significantly reduces SFSU's greenhouse gas emissions.

Sprig Electric recently installed the massive molten carbonate fuel cell, which will generate 1400 KW of electrical power, in the decommissioned steam boiler plant attached to the gym. The demonstrated project was initiated, funded and operated by PG&E. The 1.4 Megawatt DFC1500 fuel cell is manufactured by Fuel Cell Energy, Inc and has an estimated useful life of 10 years.

Electrical power generated by the fuel cell will be fed to the campus main substation and will have the capability to be fed back to PG&E's power grid. The output of the transformer is connected to PG&E's 12kV distribution grid at the intersection of 19th and Holloway Avenues.

"The waste heat produced by the fuel cell will be captured and used in the campus thermal heating loop for facility management," said Jim Conlow, Division Manager of Energy Solutions for Sprig Electric. "It is a great example of distributed generation. The fuel cell also gives SF State students, faculty and researchers many opportunities to study and experience the actual application of fuel cell technology."

Sprig is an industry leader in the installation of various green technologies, including fuel cells, solar panels, and electrical cars. "Our management had a commitment early on to devote a major portion of the resources of this company to sustainable energy," said Conlow.

The company has installed over 25 fuel cells in Northern California, including fuel cell plants for Franklin Templeton,

ergy Project At San Francisco State eenhouse Gases

Photography By Nick Elias

The Sprig Electric team: Back row left to right: Michael Clifton, Jim Conlow
Middle row left to right: Tony Sarti, Todd Morrell, Naseem Coates, Brook Bowmen, Marianne Combs
Front row left to right: Scott Wilson, Kate Heimsoth

Google, eBay and Walmart. Sprig installs several different kinds of fuel cells, including those for small and medium businesses as well as residences.

"The fuel cell is relieving issues with the grid in the area," said Conlow. "Because it provides electricity directly to the campus, there is electricity in the grid for neighboring areas."

"California is leading the adoption of stationary fuel cell power plants here in the USA," said Kurt Goddard, Vice President Investor Relations for Fuel Cell Energy.

"We supply megawatt-class fuel cell plants to large power users, such as this utility owned plant at San Francisco State," said Goddard. "The fuel cell generates ultra-clean electricity, but also generates usable heat. Most of our customers utilize the heat in the form of hot water or steam."

Goddard says large institutions, water treatment facilities and electric utilities choose large capacity fuel cells as a reliable form of distributed generation.

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SPRIG ELECTRIC PROJECT TEAM - HYDROGEN FUEL CELL INSTALLATION AT SAN FRANCISCO STATE UNIVERSITY:

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Electricians, IBEW Local 6,
San Francisco

Image Courtesy of Fuel Cell Energy

A 1.4 megawatt DFC1500 fuel cell by Fuel Cell Energy like the one installed by Sprig Electric at San Francisco State University.

Sprig Electric Offers A Fuel Cell For Every Application

Sprig Electric works with four major manufacturers of Fuel Cells, including Fuel Cell Energy, Bloom Energy, Clear Edge Power and UTC Power. Bloom Energy is the only fuel cell company of the four headquartered in Silicon Valley. Fuel Cell Energy makes the largest fuel cells and Clear Edge makes the smallest. The fuel cell you select depends on your need, the load of the building and whether you need heat, or just water and electricity.

Large Residences or Small Businesses—Bloom Energy 100 kW and 220 kW and Clear Edge Power, 5 kW.

Medium Businesses—UTC Power 400 kW.

Utilities, Industrial Operations, Universities, and Water Treatment Facilities—Fuel Cell Energy 1.4 and 2.8 Megawatts.

For more information contact Jim Conlow, Division Manager-Energy Solutions, jconlow@sprigelectric.com.

Photo Courtesy of Lockheed Martin

TDN wired the infrastructure for a thermal vacuum test chamber at Lockheed Martin.

A Silicon Valley Supporter of Space Technologies: TDN Electric Wires Infrastructure And Specialized Testing Systems For Lockheed Martin And NASA

Sometimes TDN Electric's work seems closer to science fiction than electrical contracting. TDN's electricians, known for their work at Silicon Valley's secret science and space centers, recently completed several installations at Lockheed Martin Space Systems in Sunnyvale and NASA Ames Research Center in Mountain View. Both projects involved implementing wiring for highly secured technology that advances the United States' space and defense programs.

TDN'S electricians push the envelope. But no matter how esoteric the wiring seems, the scientific approach is not a stretch for TDN Electric, a Sunnyvale contractor who has specialized in wiring military and space installations, as well as other complex institutional jobs, since its founding over a decade ago. The 12 electricians that worked on the projects are with IBEW (International Brotherhood of Electrical Workers) Local 332 in San Jose.

At Lockheed Martin, TDN wired $5 million in infrastructure to support the ongoing operations of a gigantic thermal vacuum test chamber, including a new electrical substation, a back up generator and a 1 megawatt fuel cell. They also wired the vacuum test chamber itself, working within a controlled environment that is classified as a Class 10000 clean room.

The thermal vacuum test chamber, which simulates the extreme environments of high altitude and space, is used to test satellites and other space technologies. TDN installed conduit and wiring inside the vacuum chamber, which is 80 feet long and approximately 40 feet tall. The test chamber is surrounded by piping which allows testers to pump liquid nitrogen through the pipes so that the vacuum chamber can reach very cold temperatures like those in space.

"The interior and immediate surroundings of the chambers are controlled environments," said Tim Daniels, President/ CEO of TDN Electric. "A task as seemingly simple as adding light fixtures involves a complicated series of steps. First you have to bead blast the factory paint finishes, remove all ferrous metal components, and then rewire the fixtures with specialized

Photo Courtesy of Lockheed Martin

In addition to wiring the thermal vacuum test chamber, TDN wired $5 million in infrastructure to support the chamber.

Teflon insulated wiring. Then the ballasts have to be remotely mounted on the exterior of the test chamber."

Daniels says it takes about four hours to mount a light on the vacuum test chamber. "There is no floor," says Daniels. "It's like going inside a circular vessel. They build a temporary platform when there is any service work done that will support a scissor lift. It is quite a complicated process."

This particular vacuum chamber, which is designated as A1, was originally built

Photo Courtesy of Aaron Klapheck

The wind tunnel is 40' x 80', and can fit a full size aircraft inside.

Image credit: NASA/Ames Research Center

TDN Electric completed the electrical power distribution and control wiring for the world's largest wind tunnel, shown in the background of the photo at the NASA Ames Research Center.

Photo Courtesy of Aaron Klapheck

The $200,000 wind tunnel is used to test airflow patterns and other specifications on aircraft.

during the 1960's. The projects supporting the upgrade of the A1 Chamber included replacing an aging interior substation with a new 4.5MVA (4.5 one thousand volt amps) double ended substation. TDN dismantled the existing substation and installed a new interior distribution power system. It originates on a new exterior substation that is located outside the building that houses the vacuum chamber. This double ended substation has the capacity to allow workers to perform maintenance on the equipment without shutting down the power. TDN installed a new megawatt backup generator right across the driveway from the substation.

TDN also installed a one megawatt Bloom Energy fuel cell near the building to help generate part of its power load. The fuel cell is encased within five containers. The conduit runs underground, and then ties into the end of the substation.

Daniels said that the project had its challenges, including procurements of specialized parts for the substation that took almost a year, but that overall the effort went smoothly. "We know the client and we know their expectations," said Daniels. "We have done a lot of work with them and have experience coordinating complex construction projects. Our crew has also worked there for a long time and understands the customer's processes."

TDN's unique space-centered electrical work also extends to support work on the gigantic wind tunnels for NASA, another long term client. Recently, TDN Electric completed the electrical power distribution and control wiring to support infrastructure for the world's largest wind tunnel, located at the NASA Ames Research Center in Mountain View. The 40' x 80' wind tunnel is so large that full size aircraft can be placed within the tunnel for testing air flow patterns and other specifications.

The $200,000 wind tunnel project was technically completed for the National Full Scale Aerodynamics Complex (NFAC), which is owned by NASA but is under lease to and operated by the United States Air Force (USAF). TDN worked on this project as a sub-contractor to mechanical contractor O.C. McDonald Company, San Jose.

TDN's electrical power distribution and control wiring installation for the wind tunnel included modifying the wiring for the Caloritech Heater Controller that helps regulate the wind tunnel's high pressure air system. The heater controller has a 1600-amp 480VAC panel that feeds into the piping system to heat the compressed air and keep it dry, so that it doesn't condensate and put water into the pipes. The project required extensive internal control wiring modifications plus testing and commissioning to rigid ANSI/NETA requirements.

"We re-commissioned the power distribution for that system including testing and re-energizing two 15KV primary transformers that had been off-line for over ten years," said Daniels.

Once again, the professional skills brought by TDN Electric's field electricians were key to the successful completion of this complex project under extremely rigorous time constraints.

It's all part of a day's work for TDN Electric, whose space odyssey, circa 2012, continues to unfold as part of the innovation that drives Silicon Valley.

For more information about TDN Electric's Data Services, contact Tim Daniels at tdaniels@tdnelectric.com, call 408.541.9000 or go to www.tdnelectric.com.

LOCKHEED MARTIN SPACE SYSTEMS (LMSS) B156 A1 CHAMBER PROJECT:

GENERAL CONTRACTOR:
Gordon Prill, Inc.

PROJECT EXECUTIVE:
Giorgio Secchi

PROJECT MANAGER:
Tim Hanlock

TDN ELECTRIC INC. TEAM

PROJECT MANAGER:
Tim Daniels

FOREMAN:
Tom Gilligan

CREW:
Sam Clark, Brian Chew, Stuart Sironin, and Todd Goebel, all from IBEW Local Union 332, San Jose

NASA AMES NFAC PROJECT:

OWNER'S REP:
Jacobs Atom Group

PROJECT MANAGER:
Ken Abramson, P.E.

PRIME CONTRACTOR:
O.C. McDonald Co.

PROJECT MANAGER:
Jason Evans

TDN ELECTRIC, INC. TEAM:

PROJECT MANAGER:
Tim Daniels

FOREMAN:
Tom Gilligan

CREW:
Sam Clark, Brian Chew, Todd Goebel, Mike Marr, all from IBEW Local Union 332, San Jose

Sprig Electric Installs Fuel Cell

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"If you have a base load need for power and heat, you would consider going with a large capacity fuel cell. Solar is great, but it is best for handling peak demands in the middle of the day when the sun is up."

- Kurt Goddard
Fuel Cell Energy

Sprig Electric has installed over 25 fuel cells in Northern California.

"If you have a constant round-the-clock demand, you go with a fuel cell. Distributed generation enables both energy security and energy reliability because you are providing the power at the point of use. You do not have to rely on transmission or distribution," Goddard said.

Adds Conlow, "Fuel cells use natural gas, and we have plenty of natural gas. Fuel cells can also be used in conjunction with solar. Compared to solar, fuel cells leave a pretty small footprint. 1.4 Megawatts of solar would occupy 3 acres; the fuel cell that produces that amount of energy sits on half an acre."

"Our power grid needs help," Conlow said. "One way to help it is to get distributed generation like fuel cells. Fuel cells work really well if you need a small footprint. They are very efficient and provide a good clean source of power for the right application. Once you get them powered up, they deliver a constant amount of power 24 hours a day."

Jim Conlow, Sprig Electric, reviews a Bloom Energy fuel cell.

For more information contact Jim Conlow, Division Manager-Energy Solutions, jconlow@sprigelectric.com.

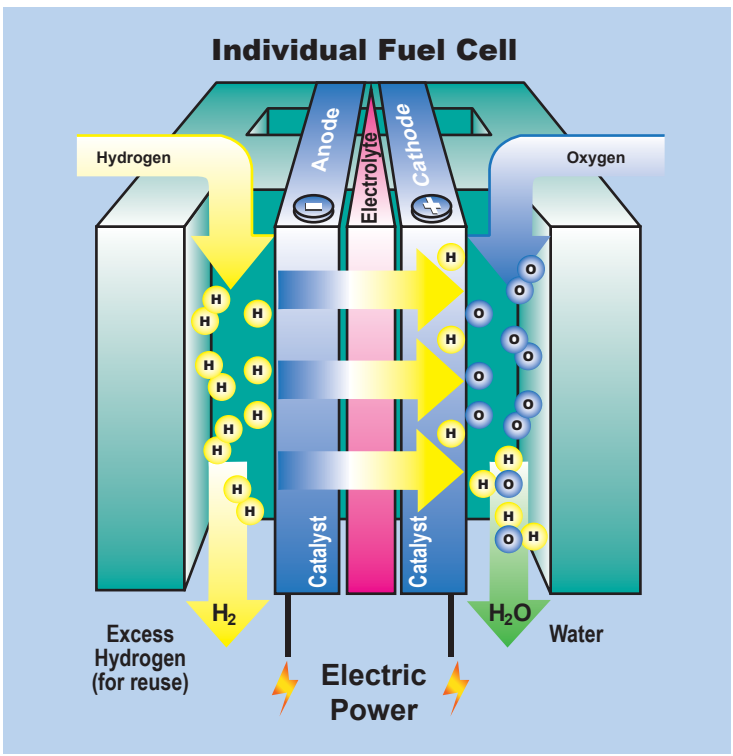

Diagram courtesy of the Office of Energy Efficiency & Renewable Energy, U.S. Department of Energy

HOW A FUEL CELL WORKS

A fuel cell is an electrochecmical device that combines hydrogen (in this case, from natural gas) with oxygen from the air to produce electricity and heat, as well as water. Fuel cells produce ultra-clean Direct Current (DC) electricity without the conventional combustion reaction.

1. The fuel cell taps into natural gas (a chemical of CH4, one carbon and four hydrogens).
2. A chamber in the fuel cell separates the carbon from the hydrogen.
3. Hydrogen goes onto the fuel cell and is used as the fuel for a chemical reaction.
4. The carbon combines with atmospheric oxygen and becomes CO2 (much less than an internal combustion engine).
5. The Hydrogen combines with oxygen and makes water and electricity.
6. The electricity is DC power.
7. The electricity is put through an inverter and turned into AC.
8. The electricity is delivered either to the facility or the grid.